Marine Mammals: Multiple Small Stocks with Insufficient Data-
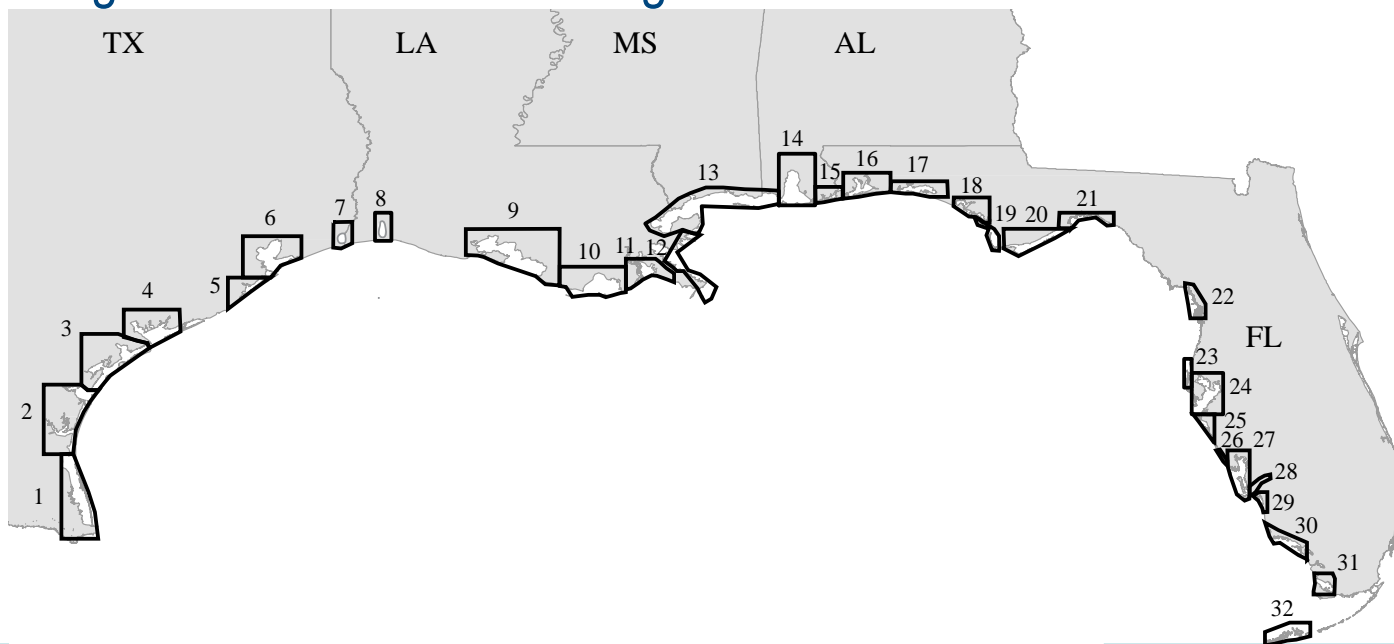## Bay, Sound, and Estuary Stocks

NOAA FISHERIES

Southeast
Fisheries
Science Center

SEFSC Protected Species Program Review

25-27 August 2015
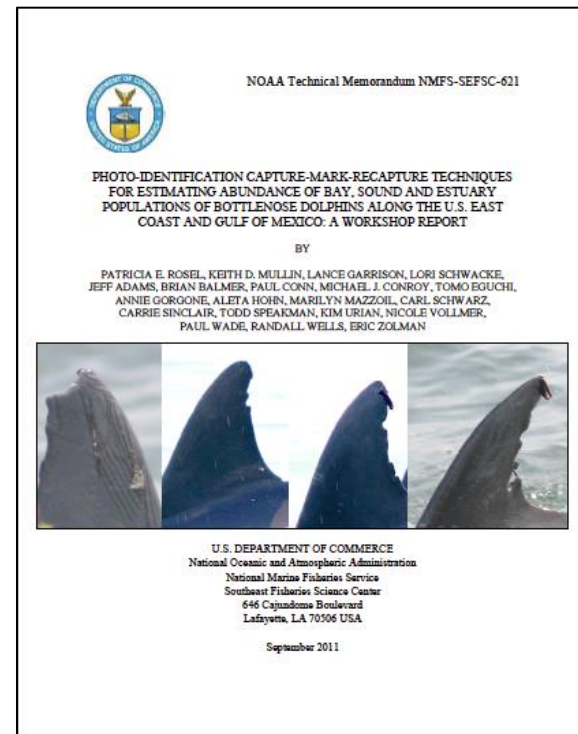**Miami, Florida**

Bay, Sound and Estuary Stocks - GOMx

- Stocks first delimited in 1994-1995 with the first Stock Assessment Reports
  - Originally 33 Bay, Sound and Estuary stocks (now 32)
  - Small areas, low abundance
  - Experience multiple lethal and sub-lethal impacts
  - Challenge for research and management
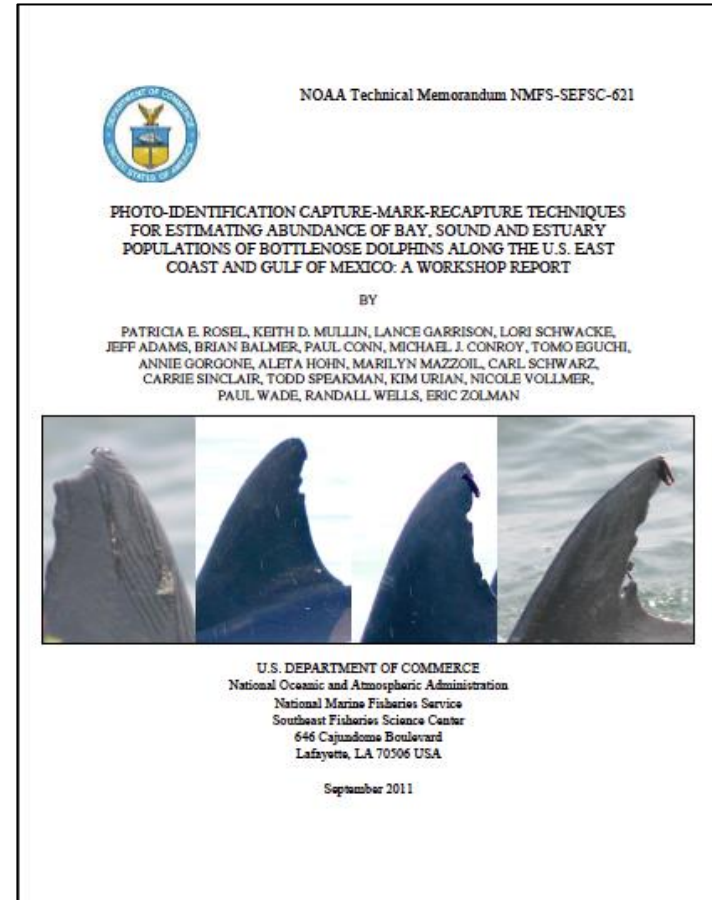
Bay, Sound and Estuary Stocks - GOMx

- Progression in Gulf of Mexico- Abundance
    - 24 stocks (77%) have abundance estimates > 8 years old
    - Standard aerial line-transect surveys generally not appropriate
    - Sought to standardize and promote consistent use of photo-ID capture mark-recapture methodologies

NOAA Technical Memorandum NMFS-SEFSC-621

PHOTO-IDENTIFICATION CAPTURE-MARK-RECAPTURE TECHNIQUES
FOR ESTIMATING ABUNDANCE OF BAY, SOUND AND ESTUARY
POPULATIONS OF BOTTLENOSE DOLPHINS ALONG THE U.S. EAST
COAST AND GULF OF MEXICO: A WORKSHOP REPORT

BY

PATRICIA E. ROSEL, KEITH D. MULLIN, LANCE GARRISON, LORI SCHWACKE,
JEFF ADAMS, BRIAN BALMER, PAUL CONN, MICHAEL J. CONROY, TOMO EGUCHI,
ANNIE GORGONE, ALETA HOHN, MARILYN MAZZOIL, CARL SCHWARZ,
CARRIE SINCLAIR, TODD SPEAKMAN, KIM URIAN, NICOLE VOLLMER,
PAUL WADE, RANDALL WELLS, ERIC ZOLMAN

U.S. DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
National Marine Fisheries Service
Southeast Fisheries Science Center
646 Cajundome Boulevard
Lafayette, LA 70506 USA

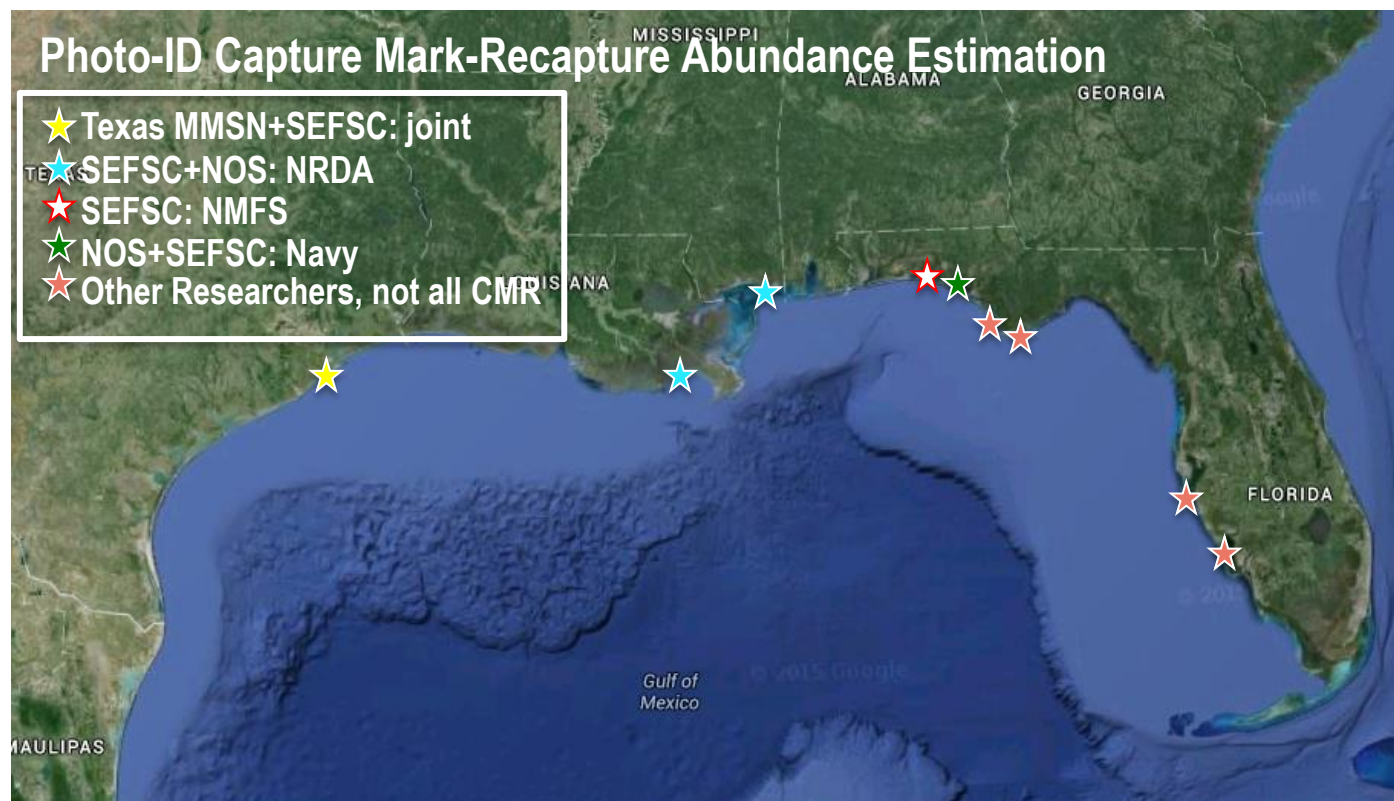September 2011

Bay, Sound and Estuary Stocks - GOMx

Critical Methodological Considerations

- Survey design
  - Spatial extent
  - Transients and seasonal timing
  - Recommend "Robust-design"
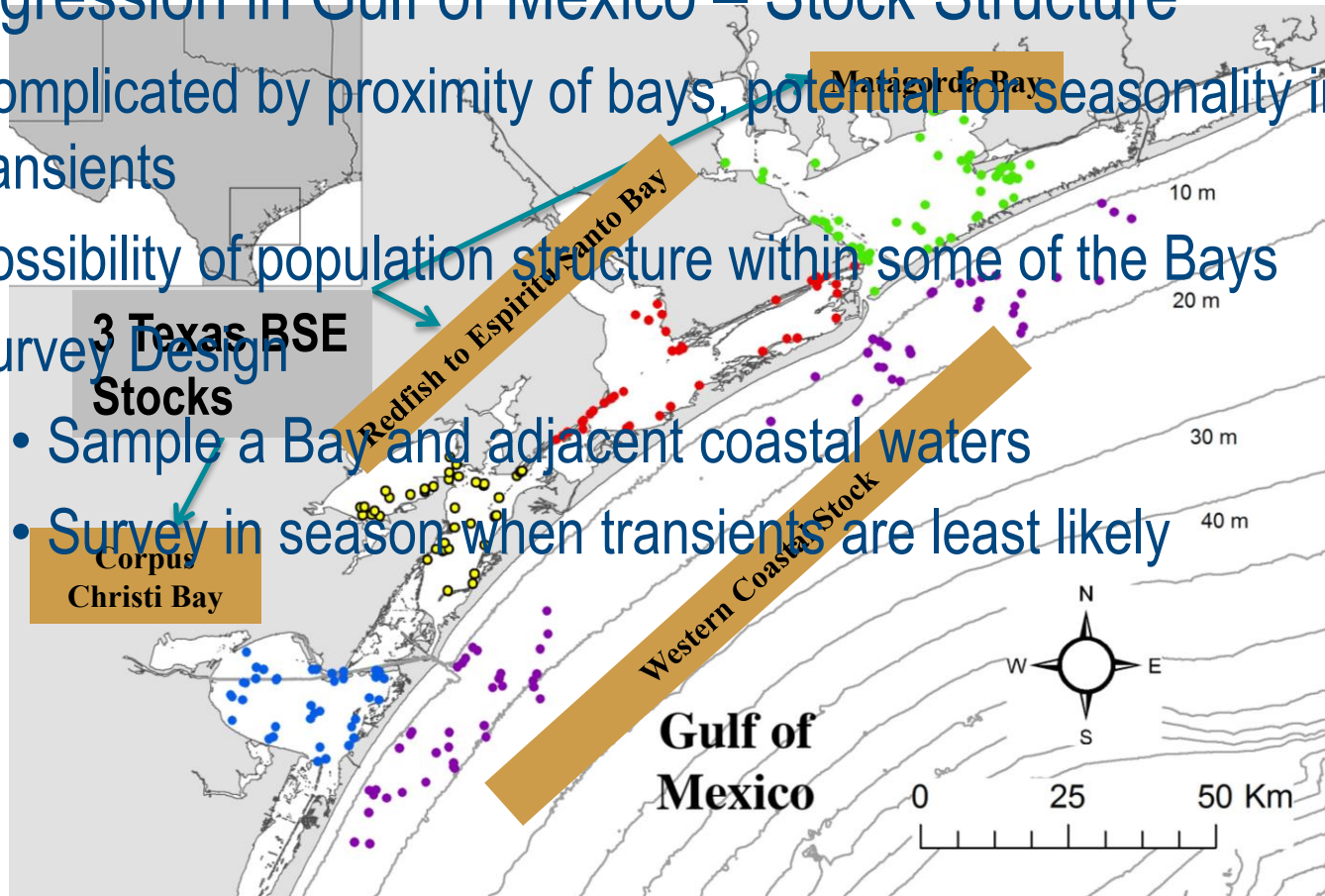- Photo quality scoring and photo-id analysis procedures

NOAA Technical Memorandum NMFS-SEFSC-621

PHOTO-IDENTIFICATION CAPTURE-MARK-RECAPTURE TECHNIQUES FOR ESTIMATING ABUNDANCE OF BAY, SOUND AND ESTUARY POPULATIONS OF BOTTLENOSE DOLPHINS ALONG THE U.S. EAST COAST AND GULF OF MEXICO: A WORKSHOP REPORT

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September 2011

Bay, Sound and Estuary Stocks - GOMx

- Progression in Gulf of Mexico - Abundance estimates less than 8 years old (n=9)

Photo-ID Capture Mark-Recapture Abundance Estimation

★ Texas MMSN+SEFSC: joint
★ SEFSC+NOS: NRDA
★ SEFSC: NMFS
★ NOS+SEFSC: Navy
★ Other Researchers, not all CMR

Bay, Sound and Estuary Stocks - GOMx

- Progression in Gulf of Mexico – Stock Structure
  - Complicated by proximity of bays, potential for seasonality in transients
  - Possibility of population structure within some of the Bays
  - Survey Design
    - Sample a Bay and adjacent coastal waters
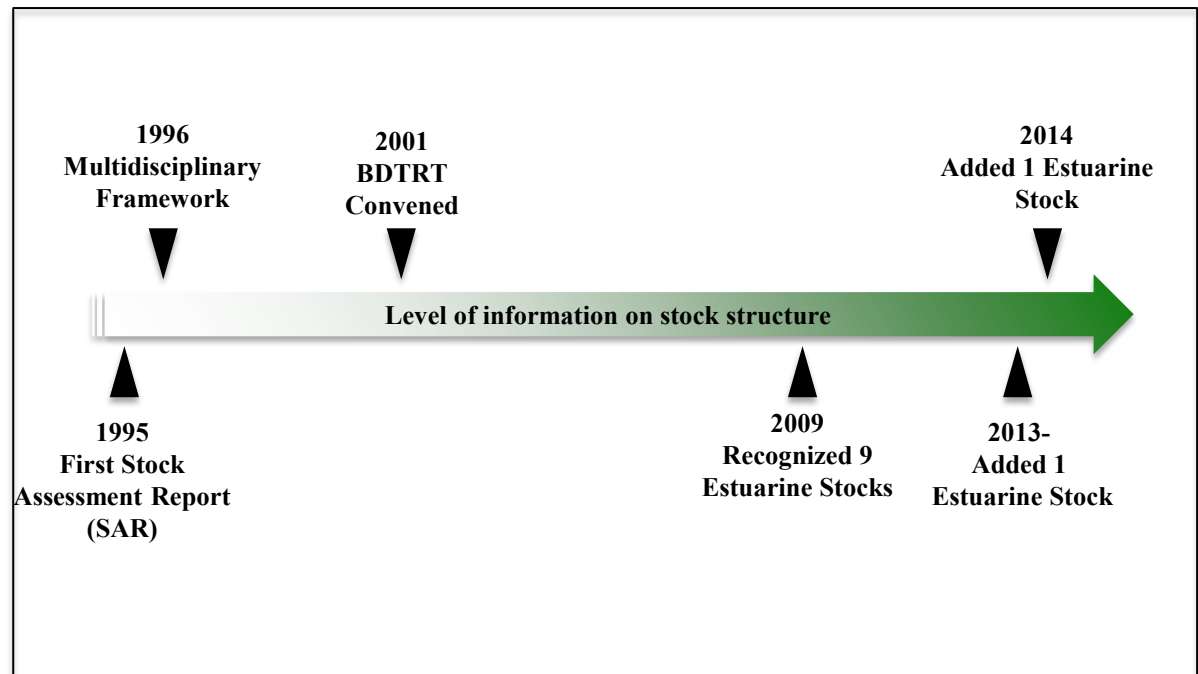   - Survey in season when transients are least likely

3 Texas BSE Stocks

Matagorda Bay

Redfish to Espirito Santo Bay

Corpus Christi Bay

Western Coastal Stock

Gulf of Mexico

10 m
20 m
30 m
40 m

N
W E
S

0   25   50 Km

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Bay, Sound and Estuary Stocks - GOMx

- Progression in Gulf of Mexico – Stock Structure
  - First confirmation of demographic independence of BSE stocks achieved through genetic analysis (Sellas *et al.* 2005)
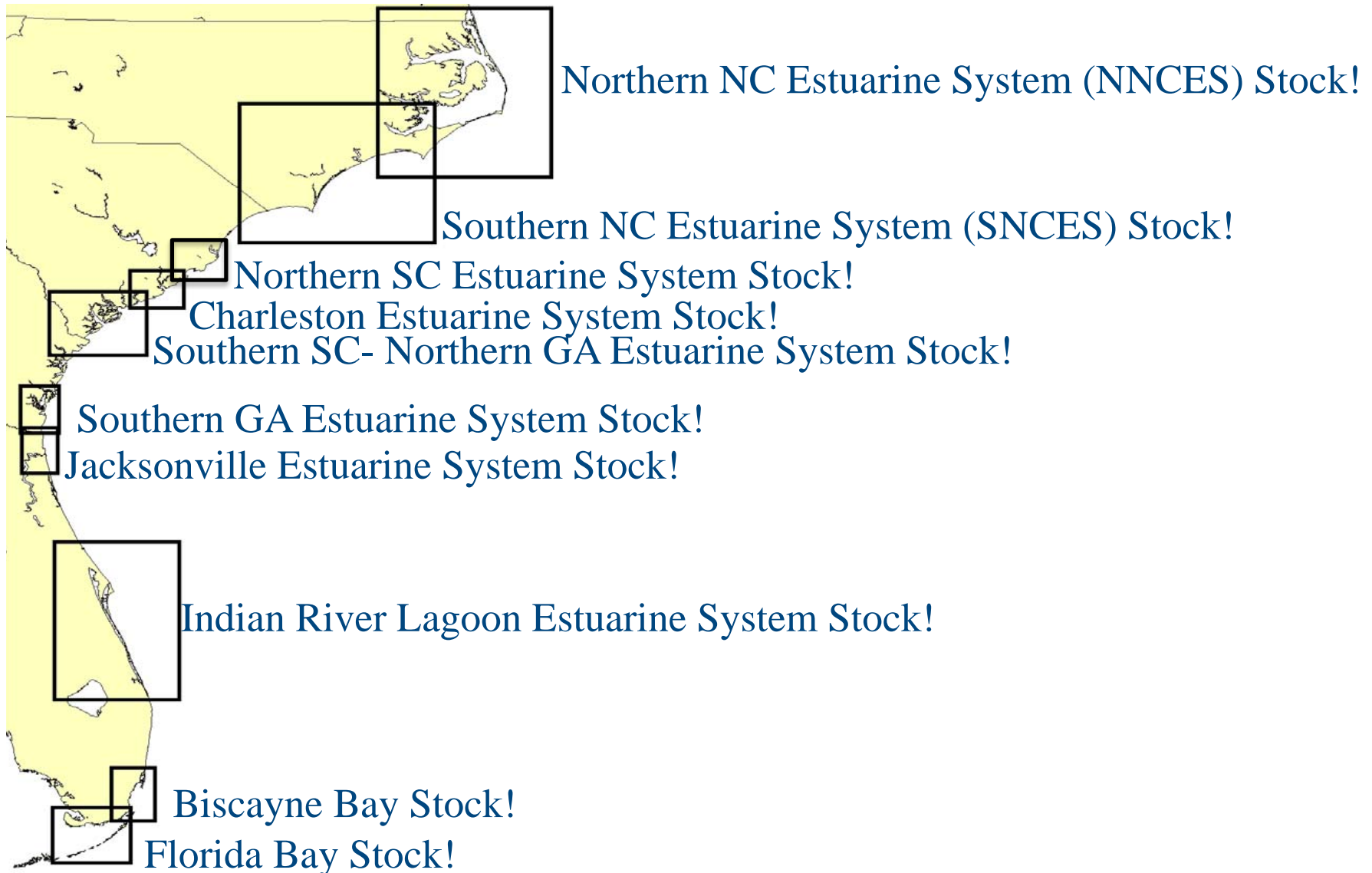

Biopsy Sampling Locations
- ★ SEFSC: BOEM
- ★ NOS+SEFSC: NRDA
- ★ SEFSC: NMFS
- ★ NOS+SEFSC: Navy
- ★ Other Collaborators

Bay, Sound and Estuary Stocks - Atlantic

- No BSE stocks delimited in the Atlantic with the first Stock Assessment Reports in 1994-1995

- 1996-present: Variety of studies indicate resident stocks
  - Photo-ID
  - Habitat inference for boundaries
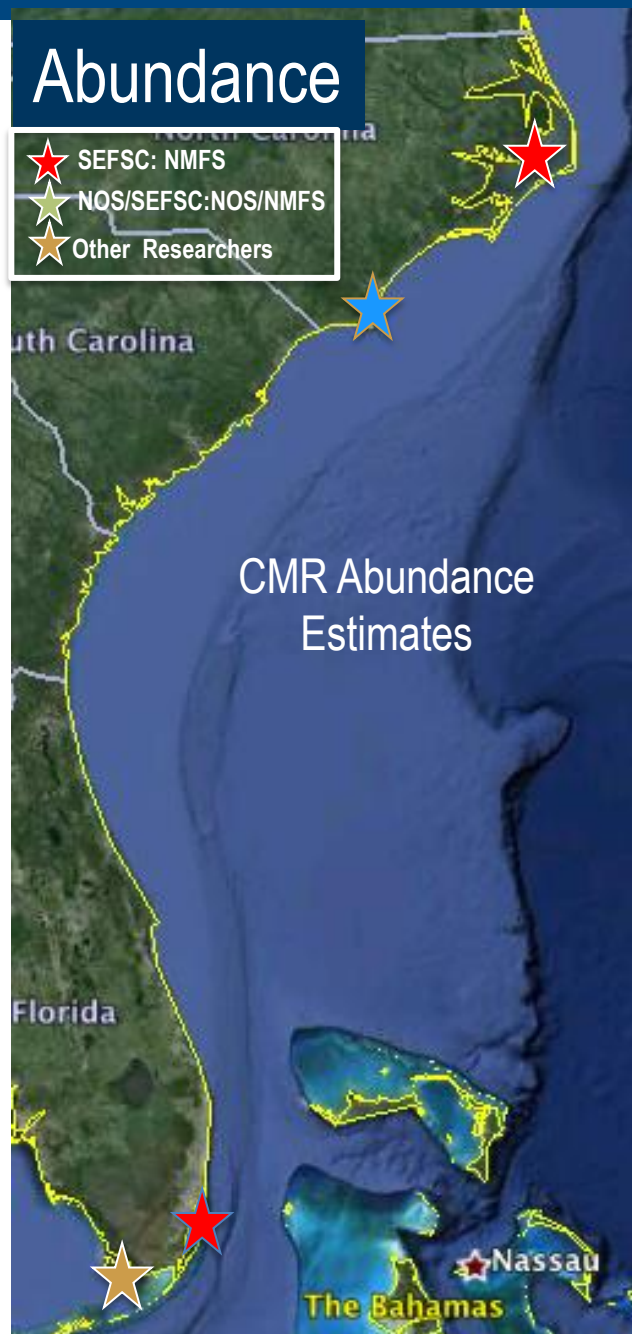 - Genetics
  - Stable isotopes
  - Telemetry

1996
Multidisciplinary Framework

2001
BDTRT Convened

2014
Added 1 Estuarine Stock

Level of information on stock structure

1995
First Stock Assessment Report (SAR)

2009
Recognized 9 Estuarine Stocks

2013-
Added 1 Estuarine Stock

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Atlantic Estuarine Year-Round Resident Stocks

Northern NC Estuarine System (NNCES) Stock!

Southern NC Estuarine System (SNCES) Stock!

Northern SC Estuarine System Stock!

Charleston Estuarine System Stock!

Southern SC- Northern GA Estuarine System Stock!

Southern GA Estuarine System Stock!

Jacksonville Estuarine System Stock!

Indian River Lagoon Estuarine System Stock!

Biscayne Bay Stock!

Florida Bay Stock!

Abundance — CMR Abundance Estimates

Legend:
- SEFSC: NMFS
- NOS/SEFSC:NOS/NMFS
- Other Researchers

Stock Structure — Biopsy Sampling
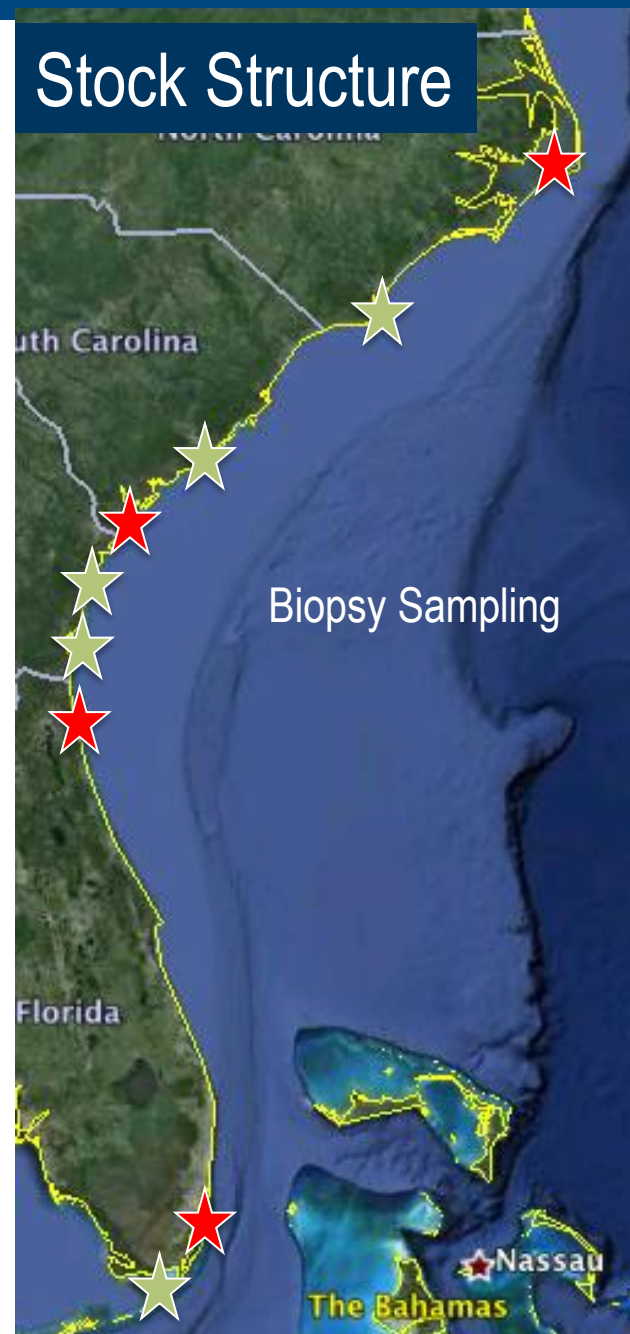
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Bay, Sound and Estuary Stocks - Mortality

- Most stocks do not have mortality estimates

- Fishery mortality does occur
  - Inshore shrimp trawl fishery is not observed
  - Crab/trap pot fisheries, commercial and recreational, unobserved
  - Mid-Atlantic gillnet fishery part of TRT for Atlantic stocks, observed
    - Documented takes are known to occur but are very rare- e.g., 1 observed take between 2007-2011. But stranding data suggest more interactions
    - Observer coverage is 1-3%
  - Very difficult to obtain accurate fishery mortality estimates

- Variety of other anthropogenic impacts (contaminants, habitat loss)

Challenges

- Estuarine bottlenose dolphins have complicated stock structure

    - Exhibit high site fidelity

    - Genetic data to date indicate limited gene flow

    - Represent demographically independent populations

    - Multiple lethal and sub-lethal stressors

- Requires dedicated crews for photo-ID to keep up with abundance estimate requirements

- Requires biopsy effort and stock structure research program to ensure stocks are correctly delineated

- Capacity allows for one CMR or biopsy survey per year

- Need for prioritization

Bay, Sound and Estuary Stocks - GOMx: Prioritization of Stocks

Recreational Fishing

Bottlenose dolphin density

Noise
Underwater Sound Mapping

Industrial Activities

Military Activities

Commercial Fishing

Prey Availability

Climate Change, Habitat Loss

Harmful Algal Blooms

Disease

Pollution Inputs
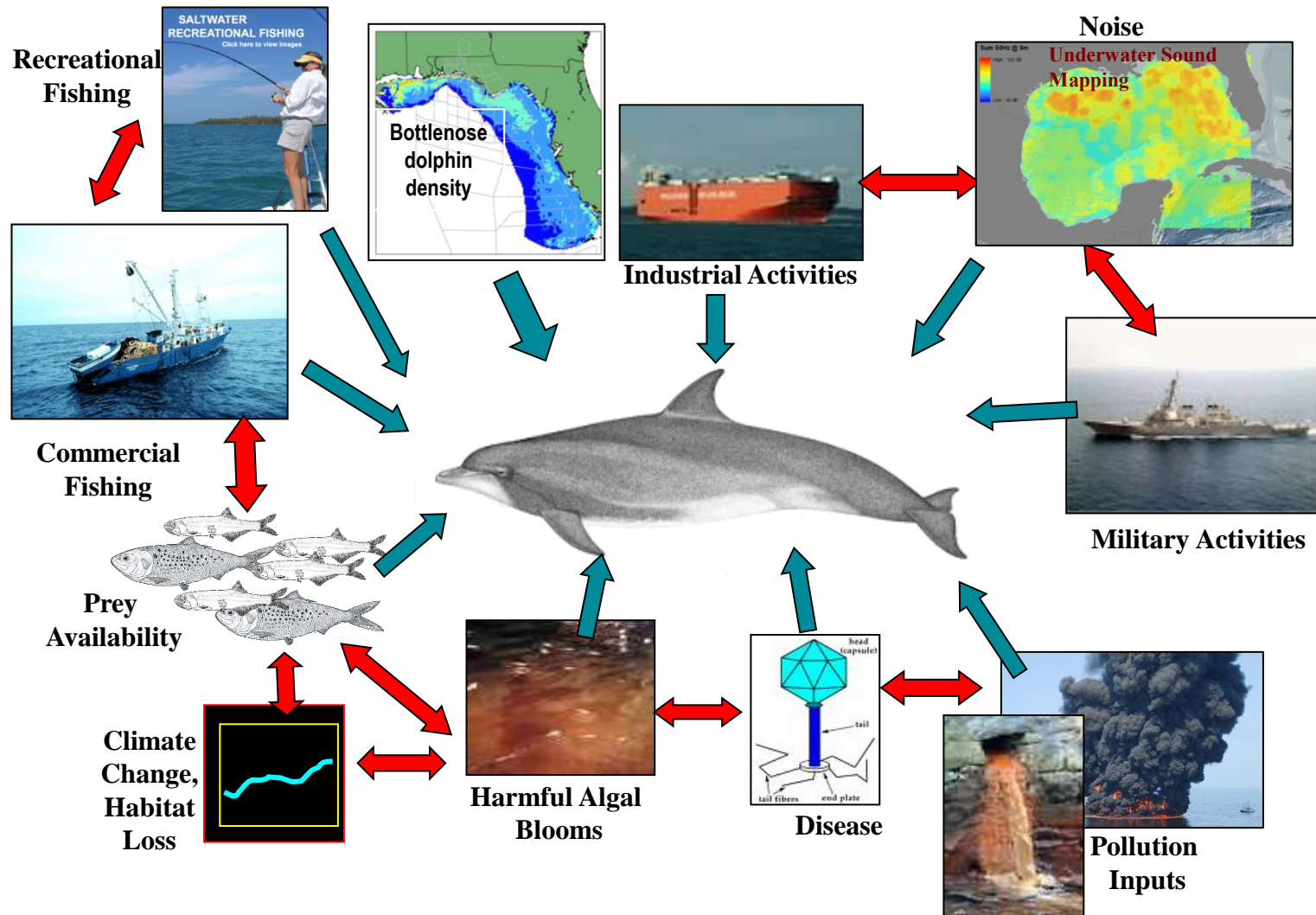
Bay, Sound and Estuary Stocks - GOMx: Prioritization of Research

NOAA Technical Memorandum NMFS-SEFSC-665

A Method for Prioritizing Research on Common Bottlenose Dolphin Stocks
Through Evaluating Threats and Data Availability:
Development and Application to Bay, Sound and Estuary Stocks in Texas

BY
NICOLE M. PHILLIPS AND PATRICIA E. ROSEL

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December 2014

- Developed a framework to prioritize BSE stocks for stock assessment research
- Accounts for potential impact of suite of stressors and for availability of stock assessment data
- Sets priority levels based upon threshold values

Stressors

Adverse weather	Freshwater inflows	Shipping
Algal blooms	Habitat loss	Tourism & boat traffic
Aquaculture	Heavy metal pollution	Unusual mortality events of unknown etiology
Chemical pollution	Hypoxia	
Climate change	Marine debris	
Commercial fisheries	Noise	
Disease	Oil & gas pollution	
Dredging & construction	Recreational fisheries	

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Bay, Sound and Estuary Stocks - GOMx: Prioritization for Research

Cumulative Threat Score	Data Availability Score		
	DAS ≤ 13	15 ≤ DAS ≤ 17	18 ≤ DAS ≤ 20
0 ≤ CTS ≤ 95	Yellow	Yellow	Yellow
95 < CTS < 152	Red	Orange	Yellow
152 ≤ CTS ≤ 228	Red	Red	Orange

Legend: ▣ Low priority ▣ Medium priority ▣ High priority

Cumulative Threat Score
Based on the potential impacts of the 19 anthropogenic and environmental stressors

Data Availability Score
Reflects information about stock structure, abundance, and mortality

High priority stocks have high potential threats and low data availability

Texas stocks completed
Louisiana stocks in progress

Strengths

- Provide standardized tools/methods to external partners for abundance estimates

- Plan for prioritizing stocks

- Proficiency with biopsy sampling and capture mark-recapture photo-ID field work and photo analysis

- Strong stock structure investigation program

Future Directions

- Complete research prioritization for Gulf of Mexico BSE stocks and adapt prioritization process to Atlantic BSE stocks, oceanic stocks

- Conduct GOMx-wide genetic analysis of BSE stock structure with samples available to date

- Ecosystem-based approach: Investigate alternative models to incorporate more than just commercial fishery interactions as the metric for status of a stock; risk assessment that incorporate status and trends, identify major risks, quantify the cumulative impacts of human activities and environmental variation

- Improve demographic population models that incorporate reproductive parameters (which we don't yet have)

Discussion Topics

- Is the work we are doing reflective of scientific best practices?

- Do you see an opportunity for SEFSC to shift resources from an existing activity to deal with an unmet need?

- Are stocks being prioritized properly?

- Discuss the major limitations/weaknesses of protected species abundance, distribution and genetic studies and how could they be resolved?

SEFSC MMPA Permit

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